



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/805,890	03/22/2004	Padmapani C. Nallan	7017	1896
44182	7590	11/23/2005	CI/ETCH/METAL-NVM/JB	
MOSER, PATTERSON & SHERIDAN, LLP APPLIED MATERIALS INC 595 SHREWSBURY AVE SUITE 100 SHREWSBURY, NJ 07702			EXAMINER	
			TRAN, BINH X	
			ART UNIT	PAPER NUMBER
			1765	
DATE MAILED: 11/23/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/805,890

Applicant(s)

NALLAN ET AL.

Examiner

Binh X. Tran

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 April 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18, 21 and 22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18, 21 and 22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7-30-04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Double Patenting

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 1-15, 17, 21-22 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-17 of U.S. Patent No. 6,806,095. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of US 6,806,095 is narrower than the current application (10/805,890) claims by further disclose the dielectric constant of the dielectric material is greater than 4. However, the dielectric material for both US 6,806,095 and the claims of current application is identical. Dielectric constant is a property of the material. A chemical composition and its properties are inseparable.

3. Claims 1-15, 17, 21-22 provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-7, 9-20 of copending Application No. 10/143,397. Although the conflicting claims are not identical, they are not patentably distinct from each other because claims copending application 10/143,397 is narrower than the current application (10/805,890) claims by further disclose the dielectric constant of the dielectric material is greater than 4. However, the dielectric material for both US 6,806,095 and the claims of current application is identical. Dielectric constant is a property of the material. A chemical composition and its properties are inseparable.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

4. Claims 1-8, 10, 12-13, 15, 17-18, 21-22 provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8 of copending Application No. 10/194,566. Although the conflicting claims are not identical, they are not patentably distinct from each other because claims copending application 10/194,566 is narrower than the current application (10/805,890) claims by further disclose the dielectric constant of the dielectric material is greater than 4 and etching produce residue. However, the dielectric material for both US 6,806,095 and the claims of current application is identical. Dielectric constant is a property of the material. A chemical composition and its properties are inseparable.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-6, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moise et al. (US 2001/0055852).

Respect to claims 1-4, Moise discloses a method for etching comprising the step of:

introducing into an etch chamber a substrate having a dielectric material (such as PZT);

providing into the etch chamber a process gas comprising CO and Cl₂
(paragraph 0159, 0160, 0166);

expose the dielectric material to a plasma formed from the process gas.

Moise further discloses it is possible to replace PZT with Hf containing material as an alternate material (paragraph 0148). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Moise by etching Hafnium containing material with CO and chlorine because equivalent and substitution of one for the other would produce an expected result.

Respect to claim 5, Moise discloses the flow rate of each individual gas is a result effective variable. The result effective variable is commonly determined by routine experiment. The process of conducting routine experiments so as to produce an expected result is obvious to one of ordinary skill in the art. Hence, it would have been obvious to one having ordinary skill in the art, at the time of invention, to perform routine experiments to obtain optimal flow rate.

Respect to claim 6, Moise discloses the step of maintaining a gas pressure of 10 mtorr (paragraph 0097, read on applicant's range of 2-100 mtorr). Respect to claim 10, Moise discloses the step of applying power at 1500 W (paragraph 0165, read on applicant's range of 200-2500 Watts).

8. Claims 7-9, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moise in view of Guinn et al. (US 5,877,032).

Respect to claim 7-9 and 11, Moise fails to disclose the specific gas pressure, bias power, and source power values. In a plasma etching method, Guinn discloses that the plasma process parameters such as pressure, source power, and bias power are result effective variables (col. 4 lines 4-6). The result effective variable is commonly determined by routine experiment. The process of conducting routine experiments so

as to produce an expected result is obvious to one of ordinary skill in the art. Hence, it would have been obvious to one having ordinary skill in the art, at the time of invention, to perform routine experiment to obtain optimal results.

9. Claims 12-18, 21-22 rejected under 35 U.S.C. 103(a) as being unpatentable over Moise in view of Jeon (US 6,790,755)

Respect to claims 12, 17 and 21, Moise fails to disclose the dielectric material is TaO₂ (aka tantalum oxide) or ZrO₂ (aka zirconium oxide) or ZrSiO₂ (aka zirconium silicate), or HfSiO₂ (aka hafnium silicate). However, Moise clearly teaches to use high-k dielectric material including PZT. In a method for making semiconductor device, Jeon teaches to use PZT, tantalum oxide, zirconium oxide, zirconium silicate or hafnium silicate as a high-k dielectric material. Hence, it would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Moise in view of Jeon by using tantalum oxide, zirconium oxide, zirconium silicate or hafnium silicate because equivalent and substitution of one for the other would produce an expected result.

Respect to claims 13-14, Moise discloses the step of maintaining a temperature of 250-400 °C during etching (paragraph 0205, read on applicant's claimed range). The limitation of claims 15, 18 and 22 has been discussed above under Moise's reference. Respect to claim 16, Moise teaches to use HCl as a chlorine source (table in paragraph 0160).

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh X. Tran whose telephone number is (571) 272-

Art Unit: 1765

1469. The examiner can normally be reached on Monday-Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Binh Tran

Binh X. Tran